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POS-43 - A review of statistical methods in the discovery of the Higgs boson at the LHC

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The Standard Model in 1967 (Salam 1968, Weinberg 1967) incorporated the theoretical Higgs boson unified theory for the weak and electromagnetic interactions. In 2012 Higgs boson was confirmed as a new particle with characteristics very similar to those first predicted theoretically in 1964 (Higgs 1964). Standard Model is the theory currently accepted by the scientific community to explain the behavior of the Universe at particle scale, including the scale of the Universe and has succeeded in making several predictions experimentally confirmed, decades later. This model includes the Higgs field, fundamental to explain the origin of the mass of the elementary particles. We focused here, on three distributions largely used in the statistical universe. Special importance has been given to the normal distribution, the uniform distribution of continuous and continuous exponential distribution. The normal distribution wanted to illustrate their use through a real case that is at the forefront of scientific knowledge, which is the search for the Higgs boson and its close relationship with the statistics to be able to distinguish what in fact is presented as a new particle of what is just background noise. Examples were given to illustrate, using always the practical presentation of results with the use of R software, several inherent in this distribution parameters as well as practical examples of how these parameters can be used to solve real problems. For uniform distribution we try to emphasize its importance for simulation, that generally all major simulation methods both for continuous and discrete event based on continuous uniform distribution. Inally, a new practical example was given in solving a problem using statistical methods of R software applied to this distribution.

Authors: Dr FRANCISCO, Carla (Université Laval); Prof. OLIVEIRA, Teresa (Aberta University); Prof. DUCHESNE, Thierry (Universite Laval)

Presenter: Dr FRANCISCO, Carla (Université Laval)

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